

WHAT IS CLAIMED IS:

1. A multi-layer printed circuit board comprising:
an insulation substrate;
a surface conductive pattern disposed on a surface of the insulation substrate; and
an inner conductive pattern embedded in the insulation substrate,

wherein the surface conductive pattern has a surface roughness on an insulation substrate side, the surface roughness of the surface conductive pattern being larger than that of the inner conductive pattern.

2. The multi-layer printed circuit board according to claim 1,

wherein the inner conductive pattern includes a high frequency conductive pattern for providing a high frequency circuit.

3. The multi-layer printed circuit board according to claim 1,

wherein the insulation substrate has a construction in such a manner that a plurality of thermoplastic resin films are integrally laminated,

wherein the inner conductive pattern and the surface conductive pattern are made of metallic film, and provide wiring layers, respectively, and

wherein the surface conductive pattern has one side exposed to an outside, the one side being opposite to the insulation

substrate side.

4. The multi-layer printed circuit board according to claim 2,

wherein the high frequency conductive pattern is a strip line, wherein the strip line includes a strip-shaped conductive pattern and a pair of wide grounding conductive patterns, and

wherein the strip-shaped conductive pattern is sandwiched between the wide grounding conductive patterns through the insulation substrate in a thickness direction of the insulation substrate.

5. The multi-layer printed circuit board according to claim 4,

wherein each grounding conductive pattern has a surface roughness on one surface facing each other and another surface roughness on another surface opposite to the one surface, and

wherein the surface roughness on the one surface facing each other is smaller than the other surface roughness on the other surface opposite to the one surface.

6. The multi-layer printed circuit board according to claim 2,

wherein the high frequency conductive pattern is a micro strip line,

wherein the micro strip line includes a strip-shaped conductive pattern and a wide grounding conductive pattern, and

wherein the strip-shaped conductive pattern is disposed on the wide grounding conductive pattern through the insulation substrate in a thickness direction of the insulation substrate.

7. The multi-layer printed circuit board according to claim 6,

wherein each of the grounding conductive pattern and the strip-shaped conductive pattern has a surface roughness on one surface facing each other and another surface roughness on another surface opposite to the one surface, respectively, and

wherein each surface roughness of the grounding conductive pattern and the strip-shaped conductive pattern on the one surface facing each other is smaller than the other surface roughness of the grounding conductive pattern or the strip-shaped conductive pattern on the other surface opposite to the one surface, respectively.

8. A method for manufacturing a multi-layer printed circuit board, the method comprising the steps of:

preparing a strip-shaped conductive pattern film by forming a strip-shaped conductive pattern made of metallic film on a resin film made of thermoplastic resin;

preparing a pair of grounding conductive pattern films by forming a wide grounding conductive pattern made of metallic film on a resin film made of thermoplastic resin;

preparing a spacer film including a resin film made of thermoplastic resin without any conductive pattern disposed on a

part of the surface of the resin film, the part corresponding to the grounding conductive pattern;

laminating the strip-shaped conductive pattern film, the spacer film and the grounding conductive pattern films in such a manner that a pair of grounding conductive pattern films is arranged to face the grounding conductive patterns of the ground conductive pattern films together so that each surface of the grounding conductive pattern film disposing the grounding conductive pattern faces inside, respectively, the spacer film is laminated on the surface of the strip-shaped conductive pattern film disposing the strip-shaped conductive pattern of the strip-shaped conductive pattern film, and the laminates of the strip-shaped conductive pattern film and the spacer film are inserted between a pair of the grounding conductive pattern films so that the grounding conductive pattern films are disposed on both sides of the strip-shaped conductive pattern film through the resin film; and

bonding each resin film together by heating and pressurizing the laminates of the strip-shaped conductive pattern film, the spacer film and the grounding conductive pattern films.

9. A method for manufacturing a multi-layer printed circuit board, the method comprising the steps of:

preparing a strip-shaped conductive pattern film by forming a strip-shaped conductive pattern made of metallic film on a resin film made of thermoplastic resin;

preparing a grounding conductive pattern film by forming a wide grounding conductive pattern made of metallic film on a resin

film made of thermoplastic resin;

preparing a spacer film including a resin film made of thermoplastic resin without any conductive pattern disposed on a part of the surface of the resin film, the part corresponding to the grounding conductive pattern;

laminating the strip-shaped conductive pattern film, the spacer film and the grounding conductive pattern film in such a manner that the grounding conductive pattern film and the strip-shaped conductive pattern film are arranged to face the grounding conductive pattern of the ground conductive pattern film and the strip-shaped conductive pattern of the strip-shaped conductive pattern film together so that each surface of the grounding conductive pattern film disposing the grounding conductive pattern and the surface of the strip-shaped conductive pattern film disposing the strip-shaped conductive pattern faces inside, respectively, the spacer film is inserted between the strip-shaped conductive pattern film and the grounding conductive pattern film so that the grounding conductive pattern film is disposed on one side of the strip-shaped conductive pattern film through the resin film; and

bonding each resin film together by heating and pressurizing the laminates of the strip-shaped conductive pattern film, the spacer film and the grounding conductive pattern film.